

CLAIMS

in Patent Application entitled

MODULAR ELECTRONIC LIGHTING SYSTEM

1. An arrangement comprising:

a frequency-converting central power supply mounted at a first location; the central power supply (i) being powered by ordinary power line voltage provided from an electric utility power line, and (ii) having plural power output ports at each of which is supplied an approximately sinusoidal AC voltage of frequency substantially higher than that of the power line voltage; the central power supply being operative to limit the amount of power extractable from each power output port to a level so low that any passive load connected therewith would not give rise to a fire-initiation hazard; and

plural lighting units; each lighting unit located some distance away from the first location and including: (i) a power input port; (ii) a gas discharge lamp; (iii) a sub-assembly connected in circuit between the gas discharge lamp and the power input port; and (iv) a power supply cord connected between the power input port and one of the power output ports.

2. The arrangement of claim 1 wherein the central power supply is additionally characterized by being operative to limit the amount of power extractable from each power output port to a level not higher than 100 watt.

3. The arrangement of claim 1 wherein the central power supply is further characterized by including a parallel-resonant LC circuit connected with each power output port.

4. The arrangement of claim 1 wherein each power supply cord has a pair of conductors and is further characterized by having substantially the same capacitance as measured between its pair of conductors.

5. The arrangement of claim 1 wherein the power supply cords may be of different lengths yet exhibit between its conductors substantially the same amount of capacitance.

6. The arrangement of claim 1 wherein: (i) said ordinary power line voltage is provided at a pair of power line conductors disposed within a junction box; and (ii) said first location is defined as being within a distance of six feet from the junction box.

7. The arrangement of claim 1 wherein at least several of the power supply cords are bundled together to form a single cable entity consisting of plural separate pairs of conductors.

8. The arrangement of claim 1 wherein the central power supply is further characterized in that (i) it includes plural frequency-converting power supplies, and (ii) the AC voltage supplied at one of the power output ports is non-synchronous with respect to the AC voltage supplied at another one of the power output ports.

9. The arrangement of claim 8 wherein each of the plural frequency-converting power supplies is further characterized by including a self-oscillating inverter circuit.

10. A combination comprising:
a ceiling; and
an electronic lighting system characterized by including:

a power supply connected with the AC power line voltage of an ordinary electric utility power line; the power supply having plural individual pairs of power output terminals; an approximately sinusoidal voltage being provided between each pair of power output terminals; the fundamental frequency of the approximately sinusoidal voltage being distinctly higher than that of the AC power line voltage;

luminaires mounted at spaced-apart locations in or near the ceiling; each luminaire including a pair of power input terminals; and

a pair of power conductors connected between each pair of power output terminals and each pair of power input terminals.

11. The combination of claim 10 wherein the electronic lighting system is further characterized in that each luminaire draws an approximately sinusoidal current from the pair of power output terminals to which it is connected.

12. The combination of claim 10 wherein the electronic lighting system is further characterized in that each luminaire draws power from its associated pair of power output terminals with a near unity power factor; near unity being defined as 0.75 or higher.

13. The combination of claim 10 wherein the electronic lighting system is further characterized in that the approximately sinusoidal voltage being provided between a given pair of power output terminals is non-synchronous with the sinusoidal voltage provided between another pair of power output terminals.

14. The combination of claim 10 wherein the electronic lighting system is further characterized in that each luminaire includes an energy-storing reactance operative to store more energy than that stored in the capacitive reactance of the pair of power conductors via which it is connected to the power supply.

15. The combination of claim 10 wherein the electronic lighting system is further characterized in that each luminaire includes a gas discharge lamp connected with its associated pair of power input terminals by way of a ballasting transformer defined as including elements functional to cause current drawn by said associated pair of power input terminals, in response to a sinusoidal input voltage provided thereat, to be substantially sinusoidal and in phase with said input voltage.

16. The combination of claim 10 wherein the electronic lighting system is further characterized in that at least some of the pairs of power conductors are bundled together over at least a substantial part of the distance between the power supply and the luminaires associated with said at least some of the pairs of power conductors.

17. The combination of claim 10 wherein the electronic lighting system is further characterized in that the power supply includes an inverter having output terminals across which is connected a tank inductor.

18. The combination of claim 10 wherein: (i) said ceiling represents the ceiling of a given room; and (ii) said luminaires provide substantially all the illumination provided from the ceiling in that room.

19. The combination of claim 10 wherein said luminaires provide most of the illumination provided from the ceiling in a room.

20. The combination of claim 10 wherein said luminaires provide most of the ceiling lighting provided in a room.

21. An arrangement comprising:

a power line source providing a power line voltage at a pair of power line terminals; the power line source being further characterized in that it is functional to provide a current of substantially non-limited magnitude from the power line terminals, thereby causing the amount of power extractable from the power line terminals to be substantially non-limited and therefore to constitute a potential fire-initiation-hazard;

a power conditioner having input terminals connected with the power line terminals; the power conditioner having plural output ports at each of which is provided an approximately sinusoidal AC output voltage of frequency distinctly higher than that of the power line voltage; the power conditioner being further characterized in that each output port is (i) connected with a current-limiting sub-circuit, (ii) functional to supply an output current of frequency equal to that of the AC output voltage, (iii) manifestly prevented from supplying such output current at a magnitude higher than a certain level, thereby not to constitute a fire-initiation-hazard; and

a load assembly characterized by including (i) an input port connected with one of the output ports, (ii) a matching circuit, and (iii) a gas discharge lamp connected with the input port by way of the matching circuit; the load assembly being further characterized by drawing power from said one of the output ports at a near unity power factor, with near unity defined as 0.75 or higher.

22. The arrangement of claim 21 additionally comprising a power supply cord disconnectably connected between said one output port and said input port.

23. The arrangement of claim 21 additionally comprising:

additional load assemblies, each characterized by including (i) an input port connected with one of the output ports, (ii) a matching circuit, and (iii) a gas discharge lamp connected with the input port by way of the matching circuit; and

plural power supply cords; each individual power supply cord being connected between one of the output ports and one of the input ports.

24. An arrangement comprising:
a source of AC power line voltage;
a lamp holder operable to hold a gas discharge lamp;
a power supply operable to be powered from AC power line voltage and to provide an approximately sinusoidal output voltage at an output port; the frequency of the output voltage being distinctly higher than that of the AC power line voltage; the output port being operative to receive and hold at least one power plug of a type adapted to be received and held by an ordinary household electric receptacle;
a first power conductor providing electrical connection between the source and the power supply; and
a second power conductor operative to provide electrical connection between the output port and the lamp holder.

25. The arrangement of claim 24 wherein the lamp holder is further characterized by including a lamp socket operable to receive and hold an ordinary electric light bulb.

26. The arrangement of claim 24 wherein the gas discharge lamp is further characterized having a screw-base of a type operable to be screwed into and held by a lamp socket adapted to receive and hold an ordinary electric light bulb.

27. The arrangement of claim 24 wherein the power supply is further characterized by being: (i) connected with a rechargeable battery; and (ii) for a limited period of time, operable to provide said approximately sinusoidal output voltage even if the source were to fail to provide said AC power line voltage.

28. The arrangement of claim 24 wherein the power supply is further characterized by being connected with a rechargeable battery and: (i) at times, to charge this rechargeable battery; and (ii) at other times, to draw power from this rechargeable battery.

29. The arrangement of claim 24 wherein the power supply includes an auxiliary power input/output receptacle operative to facilitate connection with a rechargeable battery by way of a power cord, and: (i) at times, to charge this rechargeable battery; and (ii) at other times, to draw power from this rechargeable battery.

30. The arrangement of claim 24 wherein: (i) the power supply is included within a housing; and (ii) the first power conductor is represented by a pair of prongs rigidly attached to said housing and adapted to be inserted directly into an ordinary household electric receptacle.

31. The arrangement of claim 24 wherein the power supply is further characterized by being connected with a rechargeable battery and: (i) at times, to charge this rechargeable battery; and (ii) at other times, to draw power from this rechargeable battery.

32. The arrangement of claim 24 wherein the power supply is further characterized by including current-limiting circuitry operative to prevent more than a certain maximum amount of power from being extracted from the output port, thereby to provide safety from fire initiation.

33. The arrangement of claim 24 wherein the first power conductor is represented by a power track of a type such as commonly used in an ordinary track lighting system.

34. The arrangement of claim 24 wherein the power supply is further characterized by including plural output ports; each output port being adapted to receive and hold a power plug of a type adapted to be received and held by an ordinary household electric receptacle.

35. The arrangement of claim 24 further characterized by comprising plural lamp holders as well as plural second conductors.

36. The arrangement of claim 24 wherein the second conductor is an ordinary two-conductor power cord, such as used with an ordinary table lamp.

37. The arrangement of claim 24 further characterized by comprising plural lamp holders; one of the plural lamp holders being connected with the output port via the second power conductor; the other lamp holders being connected with the output port by way of said one of the plural lamp holders.

38. The arrangement of claim 24 further characterized by comprising plural gas discharge lamps; at least one of the gas discharge lamps being different from the other gas discharge lamps.

39. The arrangement of claim 24 wherein the lamp holder does in fact hold a gas discharge lamp; the gas discharge lamp being characterized by having a screw-base operative to be screwed into and held by a lamp socket of a type usually used for receiving and holding an ordinary Edison-type screw-in electric light bulb.

40. The arrangement of claim 39 wherein the gas discharge lamp is further characterized by: (i) having a longitudinal central axis and including at least two straight sections of fluorescent tubing parallel-disposed to this central axis; and (ii) snugly fitting within a cylinder of circular cross-section and with an inner diameter smaller than 2.5 times that of the screw-base.

41. A screw-in fluorescent lamp comprising:

an upper portion consisting of an upper fluorescent tube; the upper fluorescent tube being characterized by including gas and by having at least two parallel-disposed upper straight sections of fluorescent tubing; each upper straight section of fluorescent tubing having a top aperture and a bottom aperture; the two top apertures being connected together by way of a piece of connecting fluorescent tubing; and

a lower portion including at least two lower sections of fluorescent tubing; each lower section of fluorescent tubing including gas and also having: (i) a top aperture connected with the bottom aperture of one of said at least two parallel-disposed upper straight sections of fluorescent tubing; (ii) a thermionic cathode; and (iii) a set of cathode terminals connected with the thermionic cathode and accessible from the outside of the fluorescent tubing; the lower portion also including:

(a) a screw-base operative to be screwed into and be held by a lamp socket of a type operative to receive and hold an ordinary household incandescent light bulb; the screw-base having base terminals; and

(b) a circuit assembly having power output terminals connected with the cathode terminals and power input terminals connected with the base terminals.

42. The arrangement of claim 41 wherein: (i) each of the two parallel-disposed upper straight sections of fluorescent tubing has a maximum cross-sectional diameter; and (ii) the two parallel-disposed upper straight sections of fluorescent tubing are separated from each other by a distance less than half of said diameter.

43. An arrangement comprising:

an upper portion including an upper fluorescent tube; the upper fluorescent tube being characterized by having two parallel-disposed upper straight sections of fluorescent tubing; each upper straight section of fluorescent tubing having a top aperture and a bottom aperture; the two top apertures being connected together by means of a piece of connecting fluorescent tubing; the upper portion being further characterized by not including a cover through which light generated by the upper fluorescent tube would have to flow; and

a lower portion including two lower sections of fluorescent tubing; each lower section of fluorescent tubing having: (i) a top aperture connected with the bottom aperture of one of the two parallel-disposed upper straight sections of fluorescent tubing; (ii) a thermionic cathode; and (iii) a set of cathode terminals connected with the thermionic cathode and accessible from the outside of the fluorescent tubing; the lower portion also including:

(a) a screw-base operative to be screwed into and be held by a lamp socket of a type operative to receive and hold an ordinary household incandescent light bulb; the screw-base having base terminals; and

(b) a circuit assembly having power output terminals connected with the cathode terminals and power input terminals connected with the base terminals.

44. A screw-in fluorescent lamp comprising:

a base structure including a screw-base operative to be screwed into and be held by a lamp socket of a type operative to receive and hold an ordinary household incandescent light bulb; the screw-base having base terminals; and

a fluorescent tube mounted on the base structure and characterized by including at least two parallel-disposed straight sections of fluorescent tubing; the fluorescent tube having thermionic cathodes connected with the base terminals by way of electronic circuitry; each of said straight sections of tubing having a maximum cross-sectional diameter; the fluorescent tube being further characterized in that the two straight sections of tubing are separated from each other by a distance no larger than one third of said diameter.

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